## I. Status of th Claims

Claims 1, 2, 5-8 and 10-13 are pending in this application. Claims 1 and 12 have been amended. Support for these amendments can be found at, for example, page 3 and 4 of the present application. Claim 13 has been canceled. No new matter has been introduced.

## II. Rejection Under 35 U.S.C. §102(e) and §103(a)

The Examiner has rejected claims 1, 2, 5, 6, 8 and 10-13 under 35 U.S.C. §102(e) as anticipated by or, in the alternative, 35 U.S.C. §103(a) as being unpatentable over Obuchi et al. or Tsai et al. The Examiner further rejects claim 7 under 35 U.S.C. §103(a) as being unpatentable over Obuchi et al. or Tsai et al. and further in view of Yamada et al. This rejection is respectfully traversed.

As amended, claims 1 and 12, require a **fastener component** made of a biodegradable resin material. None of the references cited by the Examiner discloses or suggests a fastener component made of a biodegradable resin material.

Obuchi et al. teaches a resin composition used for food packaging containers, daily necessaries, leisure goods, medical supplies, agricultural and fishery goods, etc. (col. 9, lines 3-45). On the other hand, Tsai et al. teaches a thermoplastic composition useful in making multi-component fibers or non-woven structures that may be used in a disposable absorbent product intended for the absorption of fluids such as body fluids (abstract). Yamada et al. teaches a biodegradable polyester fiber to be used as an industrial material such as fishnets, fishing lines, fly-screens, bags for compost, etc.

Traditionally biodegradable resins are not used in fasteners because they incur problems with strength and moldability. The present invention provides a biodegradable

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resin having sufficient strength to effectively be used in products such as fasteners. The claimed resin exhibits improved moldability during production. Thus, the present invention provides a fastener component made of a biodegradable resin which does not exhibit the problems associated with prior art biodegradable resins.

Specifically, the biodegradable resin material used in the present invention comprises:

a continuous phase comprising

(a) at least one aliphatic polyester selected from the group consisting of polybutylene succinate and polyethylene adipate;

(b) an inorganic filler dispersed in said aliphatic polyester; and

(c) a disperse phase of polylactic acid, which is essentially free of said inorganic filler;

wherein the aliphatic polyester component accounts for a proportion of not less than 50% by weight of the material, and the polylactic acid is dispersed in the form of particles of diameters not more than about 9 μm in said inorganic filler containing aliphatic polyester continuous phase and accounts for a proportion in the range of 5% to 45% by weight of the material.

As shown in Fig. 1, the elongation markedly increases when the proportion of the aliphatic polyester component exceeds 50% by weight, and further the magnitude of percent strain surpasses 200% and the elongation reaches the maximum when the proportion of the polylactic acid component is in the range of 5% to 45% by weight. The improvement in elongation as shown in Fig. 1 by controlling the proportion of the

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polylactic acid component is neither disclosed nor suggested by any of the references cited by the Examiner.

Further, Fig 3. shows conspicuous increases in the material strength when the diameters of the polylactic acid particles are not more than 9 μm. Specifically, the article formed of biodegradable resin produced from the two-phase structure having particles of the polylactic acid dispersed in the matrix of the aliphatic polyester exhibits a marked improvement in strength which can be attributed to the particles of the polylactic acid having a diameter of not more than 9 μm. None of the cited references teach or suggest the claimed particle diameters.

Moreover, when a filler-containing aliphatic polyester, such as talc-containing polybutylene succinate, and the polylactic acid are used independently of each other, both exhibit only small elongations as evidenced by the fact that the elongation of polybutylene succinate containing 30% by weight of talc is 6.4% and that of polylactic acid is 1.0%. When using a talc-containing polybutylene succinate for the continuous phase and a polylactic acid for the dispersed phase, an article formed of this biodegradable resin exhibits an elongation close to 300%. See Fig. 4. Fig. 4 shows the data of elongation at rupture obtained in a tensile test performed on samples of resin material using polybutylene succinate containing 30% by weight of an inorganic filler (talc or calcium carbonate) and polylactic acid at varying mixing ratios. The results shown in Fig. 4 indicate that by using the talc-containing polybutylene succinate for the continuous phase and the polylactic acid for the disperse phase, i.e., forming a three - phase structure, the resultant biodegradable resin material exhibits unexpectedly superior elongation. It is further clear from the results shown in Fig. 4 mentioned above

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that for the sake of imparting high elongation to the resin material, the biodegradable resin forming the disperse phase preferably accounts from 5% to 45% by weight based on the total weight of the biodegradable resin material.

The above characteristic features and advantages of the present invention are neither taught nor suggested by any of the references cited by the Examiner. Withdrawal of this rejection is respectfully requested.

Finally, the Examiner continues to interpret the Show Highpolymer Co., Ltd., "Bionolle #1020" as butylene succinate resin comprising 30% talc. Applicants enclose herewith an English translation of selected passages of "TECHNICAL DATA SHEET"- Bionolle, biodegradable Plastics (1996) issued by Showa Highpolymer Co., Ltd. which establish that Bionolle #1020 is an aliphatic polyester chemically synthesized mainly from glycol and aliphatic dicarboxylic acid.

In view of the foregoing amendments and remarks, Applicants respectfully request the reconsideration and reexamination of this application and the timely allowance of the pending claims.

If there are any additional fees due in connection with the filing of this Amendment, such as fees under 37 C.F.R. §§1.1.6 and 1.17, please charge the fees to our Deposit Account No. 06-0916. If a fee is required for an extension of time under 37 C.F.R. §1.136 not accounted for above, such and extension is requested. This fee also should be charged to our Deposit Account No. 06-0916. Any overpayment may be credited to Deposit Account No. 06-0916.

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Respectfully submitted,

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Dated: June 27, 2001

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## APPENDIX I

### Claim Amendment

Items within the claims that are bracketed are deleted and items that are underlined are added.

1. A formed article [made of a biodegradable resin material], comprising a fastener component, said fastener component is made of a biodegradable resin material comprising:

a continuous phase comprising

(a) at least one aliphatic polyester selected from the group consisting of polybutylene succinate and polyethylene adipate;

(b) an inorganic filler dispersed in said aliphatic polyester; and

(c) a dispersed phase of polylactic acid, which is essentially free of said inorganic filler;

wherein said aliphatic polyester component accounts for a proportion of not less than 50% by weight of the material, said polylactic acid [are] is dispersed in the form of particles of diameter not more than 9 μm in said inorganic filler containing aliphatic polyester continuous phase and accounts for a proportion in the range of 5% to 45% by weight of the material.

12. A formed article [made of a biodegradable resin material], comprising a fastener component, said fastener component is made of a biodegradable resin material comprising:

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a continuous phase of at least one aliphatic polyester selected from the group consisting of polybutylene succinate and polyethylene adipate: and

a dispersed phase of polylactic acid,

wherein said aliphatic polyester component accounts for a proportion of not less than 50% by weight of the material and said polylactic acid [are] is dispersed in the form of particles in said aliphatic polyester wherein the diameter of the particles of said polylactic acid is not more than 9 μm and accounts for a proportion in the range of 5% to 45% by weight of the material.

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